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Notes:

1. Untranslatable words are replaced with asterisks (* **).
2. Texts in the figures are not translated and shown as is.

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Dictionary: Last updated 01/30/2006 / Priority: 1. Mechanical engineering / 2. Chemistry / 3. Mathematics/Physics

FULL CONTENTS

[Claim(s)]

[Claim 1] While a bar bends crosswise and is formed in the shape of [flat] tubing, it is a protruding line (1) to the inner surface of the center of a longitudinal direction of the cross section. In the flat tube for heat exchangers with which it bent and the cross section was formed in the shape of abbreviation theta said bar -- one surface -- brazing material (2) being covered -- the brazing material (2) bending so that it may appear in the outside surface side of a flat tube -- said protruding line (1) While consisting of what bent a part of bar by return, it is the crowning (3). The inner surface which counters is contacted, the crosswise both ends of said bar pile up mutually -- said crowning (3) It is a slit for brazing-material derivation (4) at predetermined spacing to the longitudinal direction. Or a break is formed in the outside surface side from the inner surface side, said brazing material by the side of the outside surface of a flat tube (2) melting is carried out -- it -- said slit (4) or -- minding a break -- said crowning (3) permeate between said inner surfaces and subsequently cooling solidification is carried out -- said crowning (3) Flat tube for heat exchangers with which it comes to solder between said inner surfaces.

[Claim 2] While a bar bends crosswise and is formed in the shape of [flat] tubing, it is a protruding line (1) to the inner surface of the center of a longitudinal direction of the cross section. In the flat tube for heat exchangers with which it bent and the cross section was formed in the shape of abbreviation theta said bar -- one surface -- brazing material (2) being covered -- the brazing material (2) bending so that it may appear in the outside surface side of a flat tube -- said protruding line (1) While consisting of what bent a part of bar by return, it is the crowning (3). The inner surface which counters is contacted and it is said crowning (3), while crosswise both the edges of a bar pile up doubly Edge by the side of the top contact (5) It estranges at spacing suitably in the direction of a protruding line, and is a slit for brazing-material derivation (6). [or a break] It is formed in the outside surface side from the inner surface side, and is said brazing material by the side of the outside surface of a flat tube (2). Melting is carried out, it -- said slit (6) or -- minding a break -- said crowning (3) permeate between said inner surfaces and subsequently cooling solidification is carried out -- said crowning (3) Flat tube for heat exchangers with which it comes to solder between said inner surfaces.

[Claim 3] In Claim 2, it is a slit for each brazing-material derivation (6). Or flat tube for heat exchangers with which it comes to form a break crosswise [of a bar].

[Claim 4] In either Claim 1 - Claim 3, said bar is a brazing material (2) to the surface of one of these. While being covered, it is anticorrosive material (7) to the surface of

another side. Covered flat tube for heat exchangers.

[Claim 5] While a bar bends crosswise and is formed in the shape of [flat] tubing, it is a protruding line (1) to the inner surface of the center of a longitudinal direction of the cross section. In the approach of manufacturing the flat tube for heat exchangers with which it bent and the cross section was formed in the shape of abbreviation theta It is a brazing material (2) only to one surface. Prepare the covered bar and [in the mid-position of the cross direction of the bar] It is a slit for brazing-material derivation (4) intermittently to the longitudinal direction. Or with the process which forms a break subsequently said brazing material (2) carrying out winding formation of the bar crosswise so that it may appear in the outside surface side of a tube -- said slit (4) or a break -- crowning (3) it carried out -- turning up -- a part -- said protruding line (1) while being formed The crowning (3) With the process formed so that crosswise both the edges of a bar may pile up mutually in contact with a tube inner surface, subsequently said brazing material by the side of the tube outside surface (2) fusing -- it -- said slit (4) or -- minding a break -- said crowning (3) [it is made to permeate between said inner surfaces, and] Subsequently, cooling solidification is carried out and it is said crowning (3). The manufacture approach of the flat tube for heat exchangers of providing the process which makes between said inner surfaces soldering.

[Claim 6] While a bar bends crosswise and is formed in the shape of [flat] tubing, it is a protruding line (1) to the inner surface of the center of a longitudinal direction of the cross section. In the approach of manufacturing the flat tube for heat exchangers with which it bent and the cross section was formed in the shape of abbreviation theta It is a brazing material (2) only to one surface. The covered bar is prepared, it estranges at one edge of the cross direction at the longitudinal direction, and they are many slits (6). Or with the process which forms a break subsequently The brazing material (2) Winding formation of the bar is carried out crosswise, and it is said protruding line (1) at the cuff part of the intermediate part of a bar so that it may appear in the outside surface side of a flat tube, while constituting The crowning (3) while crosswise both the edges of a bar pile up doubly in contact with a tube inner surface Edge by the side of the repeated top contact (5) Said slit for said brazing-material derivation (6) Or with the located process, a break subsequently said brazing material by the side of a flat tube outside surface (2) fusing -- it -- said slit (6) or -- minding a break -- said crowning (3) [it is made to permeate between said inner surfaces, and subsequently cooling solidification is carried out, and] Said crowning (3) The manufacture approach of the flat tube for heat exchangers of providing the process which solders between said inner surfaces.

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the approach a brazing material bends crosswise the bar by which the clad was carried out on the surface, and a cross section manufactures flat abbreviation theta-like tube for heat exchangers, and its flat tube.

[0002]

[Description of the Prior Art] While bending the bar with which the brazing material was covered by the surface, the flat tube for heat exchangers with which a protruding line bends in the inner surface of the center of a longitudinal direction of the cross section,

and a cross section is formed in the shape of abbreviation theta is proposed. The protruding line can consider the case where a winding part is formed in the longitudinal direction center section of the bar by return, and the case where started the crosswise ends edge of the bar in the shape of an L character, and it is piled up. Many covered the brazing material on the core material surface of aluminum, and when the flat tube made from aluminum was manufactured, they were used.

[0003]

[Problem to be solved by the invention] Since soldering anchoring of the fin is usually carried out at the outside surface side when manufacturing the flat tube for heat exchangers made from aluminum, a brazing material is covered there. And sacrificial anode material is covered as anticorrosive material at the inner surface side in many cases. In such a case, if a protruding line is bent by return in the center of a tube cross section, soldering with the crowning and tube inner surface cannot be performed. This is because the brazing material is covered only at the outside surface side of a tube, so a means to solder the inner surface sides does not exist.

[0004] In addition, when the both ends of a bar are bent in the shape of a cross-sectional L character, and comparing both edges, forming a protruding line and contacting the point of the protruding line to the inner surface of a tube, a brazing material is located on the boundary of both edges, and it infiltrates into a tube interior and may be able to solder the crowning and tube interior of a protruding line. However, it is not easy to bend crosswise both the edges of a bar in the shape of a cross-sectional L character correctly, and to contact the head side to a tube inner surface correctly. Then, this invention makes it a technical problem to offer the flat tube manufactured by the manufacture approach of the flat tube which can solder certainly the crowning of the protruding line, and the inner surface of a tube, and its approach while it forms a winding part in the inner surface of the center of a longitudinal direction of a cross section by return and forms a protruding line.

[0005]

[Means for solving problem] [this invention according to claim 1] while a bar bends crosswise and is formed in the shape of [flat] tubing It is a protruding line (1) to the inner surface of the center of a longitudinal direction of the cross section. In the flat tube for heat exchangers with which it bent and the cross section was formed in the shape of abbreviation theta, [said bar] one surface -- brazing material (2) being covered -- the brazing material (2) bending so that it may appear in the outside surface side of a flat tube -- said protruding line (1) While consisting of what bent a part of bar by return, it is the crowning (3). The inner surface which counters is contacted, the crosswise both ends of said bar pile up mutually -- said crowning (3) It is a slit for brazing-material derivation (4) at predetermined spacing to the longitudinal direction. Or a break is formed in the outside surface side from the inner surface side. said brazing material by the side of the outside surface of a flat tube (2) melting is carried out -- it -- said slit (4) or -- minding a break -- said crowning (3) permeate between said inner surfaces and subsequently cooling solidification is carried out -- said crowning (3) It is the flat tube for heat exchangers with which it comes to solder between said inner surfaces.

[0006] [this invention according to claim 2] while a bar bends crosswise and is formed in the shape of [flat] tubing It is a protruding line (1) to the inner surface of the center of a longitudinal direction of the cross section. In the flat tube for heat exchangers with

which it bent and the cross section was formed in the shape of abbreviation theta. [said bar] one surface -- brazing material (2) being covered -- the brazing material (2) bending so that it may appear in the outside surface side of a flat tube -- said protruding line (1) While consisting of what bent a part of bar by return, it is the crowning (3). The inner surface which counters is contacted and it is said crowning (3). while crosswise both the edges of a bar pile up doubly Edge by the side of the top contact (5) It estranges at spacing suitably in the direction of a protruding line, and is a slit for brazing-material derivation (6). [or a break] It is formed in the outside surface side from the inner surface side, and is said brazing material by the side of the outside surface of a flat tube (2). Melting is carried out, it -- said slit (6) or -- minding a break -- said crowning (3) permeate between said inner surfaces and subsequently cooling solidification is carried out -- said crowning (3) It is the flat tube for heat exchangers with which it comes to solder between said inner surfaces.

[0007] This invention according to claim 3 is a slit for each brazing-material derivation (6) in Claim 2. Or a break is the flat tube for heat exchangers which it comes to form crosswise [of a bar]. In either Claim 1 - Claim 3, as for this invention according to claim 4, said bar is a brazing material (2) to the surface of one of these. While being covered, it is anticorrosive material (7) to the surface of another side. It is the covered flat tube for heat exchangers.

[0008] [this invention according to claim 5] while a bar bends crosswise and is formed in the shape of [flat] tubing It is a protruding line (1) to the inner surface of the center of a longitudinal direction of the cross section. In the approach of manufacturing the flat tube for heat exchangers with which it bent and the cross section was formed in the shape of abbreviation theta It is a brazing material (2) only to one surface. Prepare the covered bar and [in the mid-position of the cross direction of the bar] It is a slit for brazing-material derivation (4) intermittently to the longitudinal direction. Or with the process which forms a break subsequently said brazing material (2) carrying out winding formation of the bar so that it may appear in the outside surface side of a tube -- said slit (4) or a break -- crowning (3) it carried out -- turning up -- a part -- said protruding line (1) while being formed The crowning (3) With the process formed so that crosswise both the edges of a bar may pile up mutually in contact with a tube inner surface, subsequently said brazing material by the side of the tube outside surface (2) fusing -- it -- said slit (4) or -- minding a break -- said crowning (3) [it is made to permeate between said inner surfaces, and] Subsequently, cooling solidification is carried out and it is said crowning (3). It is the manufacture approach of the flat tube for heat exchangers of providing the process which makes between said inner surfaces soldering.

[0009] [this invention according to claim 6] while a bar bends crosswise and is formed in the shape of [flat] tubing It is a protruding line (1) to the inner surface of the center of a longitudinal direction of the cross section. In the approach of manufacturing the flat tube for heat exchangers with which it bent and the cross section was formed in the shape of abbreviation theta It is a brazing material (2) only to one surface. The covered bar is prepared, it estranges at one edge of the cross direction at the longitudinal direction, and they are many slits (6). Or with the process which forms a break subsequently The brazing material (2) Winding formation of the bar is carried out crosswise, and it is said protruding line (1) at the cuff part of the intermediate part of a bar so that it may appear in the outside surface side of a flat tube. while constituting The crowning (3) while

crosswise both the edges of a bar pile up doubly in contact with a tube inner surface Edge by the side of the repeated top contact (5) Said slit for said brazing-material derivation (6) Or with the located process, a break subsequently said brazing material by the side of the outside surface of a flat tube (2) fusing -- it -- said slit (6) or -- minding a break -- said crowning (3) [it is made to permeate between said inner surfaces, and subsequently cooling solidification is carried out, and] Said crowning (3) It is the manufacture approach of the flat tube for heat exchangers of providing the process which solders between said inner surfaces.

[0010]

[Mode for carrying out the invention] Next, based on Drawings, it explains per form of operation of this invention. Drawing 1 is the partial fracture perspective view of the flat tube for heat exchangers of this invention, and shows the condition before soldering. Moreover, the 1st process of a bar for drawing 2 to manufacture this flat tube is shown, and drawing 3 shows the 2nd process. And the elements on larger scale in which drawing 4's laying with the crowning 3 of a protruding line 1, and showing connection with a part 8, and drawing 5 are the enlarged drawings showing the condition after the soldering. This flat tube forms a protruding line 1 in the inner surface of the center of a longitudinal direction of that cross section by winding by return, and contacts that crowning 3 in the superposition part 8 of the ends of a bar while it bends a bar crosswise and forms it in the shape of [flat] tubing, as shown in drawing 1 .

[0011] As a brazing material 2 is covered by only one surface of the core material 9 of aluminum and this bar is shown in drawing 4 and drawing 5 on the surface of others, that with which the anticorrosive material 7 as a sacrificial anode layer was covered is used. And it bends so that the brazing material 2 may be located in the outside surface of a tube, and both the edge piles up. The slit 4 or the break is intermittently formed in the crowning 3 of a protruding line 1. Slit 4 part of the crowning 3 carries out opening of such a slit 4 more widely by forming in the condition of a bar, as shown in drawing 2 , and subsequently bending a protruding line 1 by return like drawing 3 .

[0012] And after forming like drawing 1 , the fin which is not illustrated to the outside surface side is located, a heat exchanger core is assembled, the whole is inserted into a hot furnace, and melting of the brazing material 2 is carried out. Then, the brazing material 2 located in the cuff of a protruding line 1 permeates between a crowning 3 and a tube inner surface through a slit 4 according to capillarity. Subsequently, soldering anchoring of each part which contacts mutually as shown in drawing 5 is carried out in one by carrying out cooling solidification of the whole. In addition, although both the edges of a bar put on the crowning 3 of a protruding line 1 in this example, it may replace with it and that superposition part 8 may be located in one edge of the cross direction of a flat tube like drawing 8 .

[0013] Next, drawing 6 shows the form of operation of the 2nd of this invention, and instead of forming a slit in the crowning 3 of a protruding line 1, this example forms many slits 6 in one edge 5 of a bar crosswise, and it is bent so that that slit 6 may be located in the crowning 3 of a protruding line 1. Also in this case, what is necessary is to form the slit 6 or the break in one edge 5 of a bar beforehand, to bend it with a foaming apparatus subsequently and just to form like drawing 6 . in addition -- drawing 6 shows the condition before soldering of a flat tube -- drawing 7 -- the condition after the soldering of the is shown. That is, when the flat tube bent as shown in drawing 6 is

inserted into a hot furnace and melting of the brazing material 2 is carried out, the brazing material 2 by the side of a tube outside surface infiltrates into the inner surface side through a slit 6, and it is located between the crowning 3 of a protruding line 1, and a tube inner surface. In addition, since it is formed crosswise [of the bar], a slit 6 is the crowning (3) of a protruding line 1. Even if it carries out a location gap crosswise to some extent, a brazing material 2 can be certainly supplied to the crowning 3 of a protruding line 1.

[0014]

[Function and Effect of the Invention] In that in which according to the flat tube for heat exchangers and its manufacture approach of this invention the protruding line 1 was bent in the inner surface of the center of a longitudinal direction of a cross section, and the cross section was formed in the shape of abbreviation theta In spite of that with which the brazing material 2 was covered only at the outside surface side of the tube The brazing material by the side of the outside surface of a tube permeates between a crowning 3 and the inner surface of a tube through the slit 4 or break formed in the crowning 3 of a protruding line 1, and a protruding line 1 is joined by the inner surface of a tube by subsequently carrying out cooling solidification of it. Thereby, while the reinforcement of a tube is highly maintainable, it becomes possible to cover anticorrosive material etc. to the inner surface side of a tube.

[Brief Description of the Drawings]

[Drawing 1] The partial fracture perspective view of the flat tube in which the form of operation of the 1st of this invention is shown.

[Drawing 2] The perspective view showing the 1st process for this flat tube manufacture.

[Drawing 3] The perspective view showing the 2nd process for this flat tube manufacture.

[Drawing 4] The crossing enlarged drawing in which laying with the crowning 3 of the protruding line 1 of this flat tube, and showing connection with a part 8.

[Drawing 5] The explanatory view showing the condition after soldering of this flat tube.

[Drawing 6] The partial fracture perspective view of the flat tube in which the form of operation of the 2nd of this invention is shown.

[Drawing 7] The important section enlarged drawing showing the soldering condition of this flat tube.

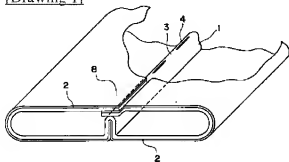
[Drawing 8] it is the flat tube in which the form of operation of the 3rd of this invention is shown, the superposition part 8 is located in the crosswise one side approach of a tube, and others have the same configuration as drawing 1 -- a part -- a fracture perspective view.

[Explanations of letters or numerals]

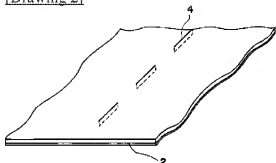
- 1 Protruding Line
- 2 Brazing Material
- 3 Crowning
- 4 Slit
- 5 Edge
- 6 Slit
- 7 Anticorrosive Material

8 Superposition Part
9 Core Material

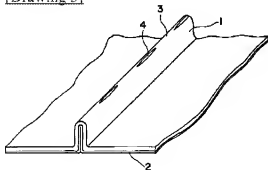
[Drawing 1]



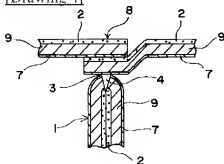
[Drawing 2]



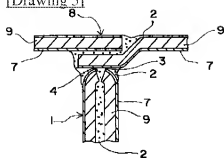
[Drawing 3]



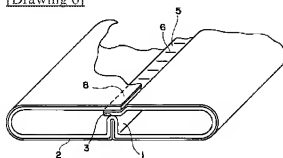
[Drawing 4]



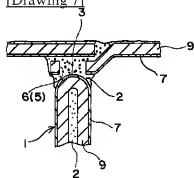
[Drawing 5]



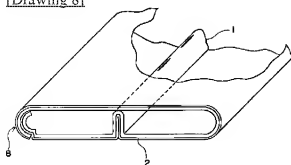
[Drawing 6]



[Drawing 7]



[Drawing 8]



[Translation done.]